Some problems in representing and organizing phonological primes

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A theory of phonological primes should:

1) account for all and only the inventory of contrastive sounds in the world's languages

2) account in a natural manner for all and only the phonological processes found in the world's languages

3) be well-motivated articulatorily and/or acoustically
Vowel-place theory  
(Clements 1993)

- Place is defined by a unified set of articulators for both vowels and consonants:
  - labial: lip constriction in C; rounding in V
  - coronal: constriction of front part of tongue in C; front V
  - dorsal: constriction at back of tongue in C; back V
  - radical: constriction in lower pharynx in C; low V

- Height features segregated under a separate Aperture node
[Labial]-only theory
(Selkirk, 1993; Watson, 2002)

- Four place features: [labial], [coronal], [dorsal], [guttural]
- No dual primary place: if multiple articulations, one is always primary, the other dependent
- e.g. /ʃ/ is:

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Place

Primary   [coronal]

Non-Primary   [dorsal]
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Radical Articulator Theory
(Halle, Vaux & Wolfe, 2000)

- 6 articulators: Lips, Tongue Blade, Tongue Body, Soft Palate, Tongue Root, Larynx; dominate terminal features that also include a designated articulator feature for each articulator:
  - e.g. Tongue Body dominates $[\pm \text{high}], [\pm \text{low}], [\pm \text{back}]$ and a unary articulator feature $[\text{dorsal}]$
- Each terminal feature, including articulator features, can spread independently; however rules cannot refer to features dominated by different articulators (*spread $[+\text{high}]$ and $[+\text{nasal}]$)
Government Phonology
(Scheer, 1999, 2001)

• The monovalent primes are called "elements", originally conceived to be independently interpretable; the resonance elements are identical for C and V
• In "classical" GP, four resonance elements: A (openness in V / RTR in C), I (palatality), U (velarity) and @ (the "cold" vowel, "relaxed tongue position")
• In Scheer's view, a fifth element is needed B (labiality in V / roundness in C)
Government Phonology

• Segments can be made up of one or more elements, of which one is the head, the other(s) operator(s)

• Each element is on a tier of its own, apart from I and U that share the same tier; e.g. (heads underlined):

\[
\begin{array}{cccccccc}
I & I & I & U & U \\
B & B & B & B & B \\
\hline \\
/i/ & /e/ & /o/ & /ɔ/ & /u/ & /o/ & /a/ \\
\end{array}
\]
Classical Arabic verbal ablaut
(e.g. McCarthy, 1991)

- Perfective and imperfective verb stems alternate in vowel quality, e.g.:
  \[\text{katab} / \text{yaktub } \text{"write"} \quad \text{\=darab} / \text{ya\=rib } \text{"beat"}\]
  \[\text{\=farib} / \text{ya\=farab } \text{"drink"} \quad \text{fa\=fal} / \text{ya\=fal } \text{"do"}\]
  \[\text{balud} / \text{yablud } \text{"be stupid"}\]
- Note that all logical combinations are not attested: \(*u\text{-a, }\*i\text{-i, }\*i\text{-u, }\*u\text{-i}\)
- Perf. \(-i\)- can only give imperf. \(-a\text{-}, \text{perf. }-\text{u- only imperf. }-\text{u; however perf. }-\text{a- appears unpredictable}\)
Ablaut behaviour of perfect -a-

- It has long been noticed that the -a- -a- ablaut grade is entirely phonologically conditioned: i.e. if C2 or C3 belong to the set /ʔ, h, ʕ, h, ƙ, χ/.

  According to McCarthy, 411/436 verbs in this ablaut grade have a guttural in C2 or C3 (95%).

  In my own sample (from Haywood & Nahmad, 1965), 73/73 (100%).

- However, McCarthy adds "Membership in classes -a- -u- and -a- -i- is entirely unpredictable". (199, p 207)
A morphophonological theory of ablaut path
(Guerssel & Lowenstamm, 1996)

• It is a well-known fact that grades -a- -u- / -a- -i- include mostly transitive verbs, whereas -i- -a- refers mostly to middle voice or transient states and -u- -u- to purely stative verbs; the fit is far from perfect, however;

• Let us assume an ablaut path of the form -i- > -a- > -u-; we obtain the three following grades:
  grade 1 : -i- -a-
  grade 2 : -a- -u-
  grade 3 : -u- -u-
A morphophonological theory of ablaut path

• In the case of -a- -i-, we see that the imperfective vowel /i/ represents the entry point of the ablaut path; we would thus expect a grade of the form -ø- -i- (call it the null grade)
• Arabic is a templatic language and an empty nucleus is impossible in the perfective template C1V1C2V2C3; the putatively empty nucleus (V2) will be filled by the only available vowel, i.e. -a- (from V1)
A morphophonological theory of ablaut path

• The complete table is thus
• Null-grade: -a- -i- (variant -a- -a- if C2 or C3 guttural)
• Grade 1: -i- -a-
• Grade 2: -a- -u-
• Grade 3: -u- -u-

• This is important, because phonological debates about feature spreading in modern Arabic dialects do not take into account these morphological patterns (inherited)
Ablaut in eastern Arabic dialects 1

- The original system has been maintained in all eastern Arabic dialects, albeit with more phonological and semantic restructuring:
- In Cairene (Holes, 1995) grade 3 has more or less been absorbed by grade 1 and so have a number of the null-grade verbs on mostly semantic grounds (evidence is not good for grade 2); as may be expected a number of grade 2 verbs have gone over to the null grade on account of opacity (-a- in the perf. in both cases)
Ablaut in eastern Arabic dialects 2

• In Bahraini (Sunni variety; Holes, 1995), the system has almost entirely broken down, there are no distinct grades in the perf. (-a- being the default vowel), and the distinctions in the imperf. are based on phonological criteria (-a- gutturals, -i- non-gutturals) and some semantic remnants (stative and middle verbs tend to have -a- even without gutturals):

\[\text{yitla}\ddot{\text{a}} \quad "go up" \quad \text{(guttural)}, \quad \text{yasil} \quad "wash" \quad \text{(plain)}, \quad \text{yigdar} \quad "be able" \quad \text{(stative)}\]
More phonological conditioning

• We thus see that in all modern eastern varieties of Arabic, the guttural consonants influence the ablaut patterns. In two other varieties, Yemeni (Qafisheh, 1999) and Baghdadi (Woodhead & Beene, 1967), ablaut patterns are also distorted by other consonant types.

• In Yemeni, null-grade verbs with C2 or C3 belonging to the set /t, s, ɣ/ or with C1 belonging to this set and C2 or C3 being [labial], have -u- instead of -i- in the imperf. Null-grade verbs with guttural C2 or C3 are not affected.
Yemeni rounding

gāsād / yuğṣūd "intend" < qāṣāda / yaqṣīdu

ḏalām / yuḏūnum "oppress" < ḏalāma / yaqṣīmu

• But
kasar / yiksir "break" < kasara / yaksiru

ẓazam / yiṣṣim "invite" < ḥazama / yaṣṣimū

• And
ṭabaṣ / yiṭbaṣ "print" < ṭabāṣa / yatbaṣu
Baghdadi rounding

- Partly same conditioning as in Yemeni: rounding is caused by emphatics in C2 or C3 (13 examples, 2 counterexamples), emphatics in C1 with labials in C2 or C3 (5 examples, no counter-example), and apparently gutturals in C1 with labials in C2 or C3 (5 examples, but 3 counter-examples).

- (McCarthy (1991, p. 220) on a similar rounding process in Palestinian Arabic: "But there are many additional complications.") Indeed! And they are morphological...
Pharyngealization vs. Dorsalization (and Rounding !)

• We need to explain the working of both processes
• Let's see how the various theories address them.
Pharyngealization in VPT

- We must go from [-open] [coronal] to [+open][pharyngeal]

A Redundancy rule is needed to turn [-open] into [+open]
Pharyngealization
Watson

- We must go from [son] [cont] [dorsal] to [son] [cont] [guttural]

Very easy!
Pharyngealization
Halle et al. (RAT)

- We must go from [+high] [-back] [-low] to [-high] [+low]

Place

<table>
<thead>
<tr>
<th>Tongue Root</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>[RTR]</td>
<td>Tongue Root</td>
</tr>
</tbody>
</table>

[Tongue Body]

[-back] [+high] [-low]

I assume a "marking statement" *[RTR] [-low]
Pharyngealization in GP
(they can't very well deal with it...)

- Guerssel & Lowenstamm, 1996, p. 5: "While we do not wish to engage in a full discussion of these data...there is a possible phonetic rationale for the phenomenon in terms of a lowering imposed by a guttural..."
Dorsalization in VPT

- We want to go from [-open] [coronal] to [-open] [dorsal][labial]

C-place

vocalic

[coronal] V-place [dorsal] [coronal]

Redundancy rule: [dorsal] [-open] is also [labial]
Dorsalization a la Watson (it can't work)...

- We need to go from [son] [cont] [dorsal] (ĩ) to [son] [cont] [labial] (u); but the emphatic trigger is [guttural]! There is no way [labial] can appear
...and a la Halle (RAT)

- We need to go from [-back] [+high] [-low] to [+back] [+high] [-low]. Easy!
- But we still need a redundancy rule to supply [+round]...
...and GP?

- In "classical" GP a la KLV (where U is both [back] and [round], it works fine

\[
\begin{array}{c}
\text{t} & \text{i} & \text{u} \\
\end{array}
\]

\[
\begin{array}{c}
\text{u} & \text{I} & \text{u} \\
\end{array}
\]

But Scheer who has two elements for back and roundness still needs the equivalent of a redundancy rule [in principle forbidden by the theory, no element can "fall from heaven"]
Conclusion

• On est pas sortis de l'auberge

OR

• There's another fine mess theory got us into